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*Published in:*  
Bolletino di zoologia

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*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
1994

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*  
Sgoifo, A., de Boer, S., Musso, E., & Koolhaas, J. (1994). Plasma catecholamines and corticosterone responses to three different stressful events in male rats (*Rattus norvegicus*). *Bolletino di zoologia*, 61, 22-22.

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## Plasma catecholamines and corticosterone responses to three different stressful events in male rats (*Rattus norvegicus*)

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Stressful situations are known to activate both the sympatho-adrenomedullary system and the pituitary-adrenocortical axis, as shown by elevated plasma concentrations of catecholamines (CAs) and corticosterone (CS). This paper reports preliminary results on stress hormones responses to three different acute environmental challenges: 1) novelty stress (NS, 1-min presentation of a novel object; N = 6); 2) conditioned emotional stress (CES, 15-min presentation of a known noxious stimulus; N = 8); 3) social stress (SS, 15-min defeat experience; N = 10). Blood samples of 0.5 ml were taken from freely moving adult male rats (*Rattus norvegicus*, wild type), via chronically implanted heart catheter externalized on top of the skull. Samples were withdrawn before, during and after the test (at  $t = -10$ ,  $t = -1$ ,  $t = 1$ ,  $t = 5$ ,  $t = 15$ ,  $t = 30$  and  $t = 60$  min). Plasma CS concentrations were determined by means of reversed-phase high-performance liquid chromatography (HPLC), CAs concentrations via HPLC in combination with electrochemical detection. Variations in hormone levels were statistically analyzed by means of ANOVA and Dunnett or Tukey post-hocs (level of significance  $p < 0.05$ ). NS provoked significant elevations of CAs as compared to control corresponding values (CTR rats, N = 7), until  $t = 5$  min sample for noradrenaline (NA) and  $t = 15$  min sample for adrenaline (A). CES induced significant elevations of A only, lasting for all the duration of the test. SS determined significant elevations of the three hormones for all the duration of the test (also extended to post-test samples in the case of corticosterone). In both novelty and conditioned emotional stress tests, max peaks were observed at  $t = 1$  min for CAs and  $t = 15$  min for CS. In the case of social stress, max peaks were documented at  $t =$

5 min for CAs, at  $t = 30$  min for CS. Cross comparison of the three environmental challenges revealed that: a) NA, A and CS increases were not significantly different between NS and CES; b) NA elevations were significantly higher in SS as compared to CES and NS at  $t = 1$ ,  $t = 5$  and  $t = 15$  min; c) A changes were significantly higher in SS as compared to CES only, at  $t = 5$  and  $t = 15$  min; d) CS increases were markedly higher in SS as compared to NS and CES during both the test and post-test. The combination of unpredictability, uncontrollability and higher somatomotor activity during SS as compared to NS and CES can explain the much higher rate of stress hormones response.